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Manuals of the Science and Art of Teaching

FIRST SERIES—No. II.

THE

CULTIVATION OF THE MEMORY

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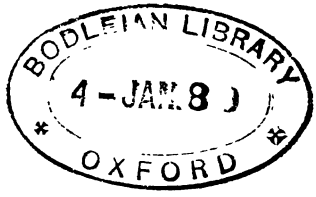

These Manuals, with the exception of the last of each series, have been written, at the request of the Literature Committee of the National Society, by men distinguished at their several Universities, and possessed of large experience either as teachers or examiners. The last of each series, that on Class Teaching and that on Apparatus, is the work in each case of a Lecturer on Method at one of the larger Training Colleges.

The writers have endeavoured in each case to connect the practice of teaching with the fundamental principles on which it should rest, and to bear in mind the capacities and needs of the particular class of readers for which these Manuals are specially intended. The chapters have been broken up into short paragraphs, with conspicuous headings, and simplicity of language has been uniformly aimed at.

In order to obtain greater clearness and precision, and to save cross-references from one Manual to another, each subject has been treated independently, and is complete in itself. This independence of authorship has necessarily caused some repetition of matter, but it will be seen that this slight addition to the bulk of the whole has largely contributed to the definiteness and completeness of the separate parts.

THE CULTIVATION OF THE MEMORY.

CHAPTER I.

WHAT MEMORY IS.

We have sometimes heard a lesson given on the geography of England which consisted almost entirely of lists of *names*, lists of mountains, rivers, bays, capes, etc., without any associations of interest by which the names could be fixed in the memory. There was a great deal of praiseworthy zeal in the lesson; the teacher had taken the greatest possible pains to cull from his text-book every *fact* of note, and had watched the clock carefully that he might bring the whole lesson into the allotted time; but there was no repose, no pause, and no reference to the children's previous knowledge as a standard of comparison.

Again, we have sometimes heard, in an infant school, a lesson given to a class of children between six and seven years of age on the manufacture of glass; this lesson was just as carefully prepared, and given in quite as praiseworthy a spirit: but it was all *words*, because it did not rest upon the children's experience as a standard of comparison; the ingredients of glass, the process of manufacture, its qualities, kinds, and uses, were all talked about, but there was very little in common with the children's previous knowledge.

Let us ask ourselves in what were both these lessons wanting? They were deficient in three points:—

(1) There was *no time* for the sense-impression, by touch, or look, or hearing, to travel to the brain.

(2) There was *no association* with the children's own experience, as a basis for additional knowledge.

(3) The various facts given were not of a nature to be permanently and intelligently associated by a child.

The lessons were probably not lost entirely: happily, the minds of children are seldom entirely passive; they selected some few things that arrested their attention. Either a sound or some other sense-impression, or some faint connection with their previous knowledge, or the wish to learn helped them to remember some of the points of the lesson. But the best thing that could happen was that they should forget, as soon as possible, the greater part of it, and not burden their minds with *indistinct, unassociated, unsuitable* ideas.

But, before we proceed to the discussion of what Memory is, and how it may be cultivated, we ought to notice one very important fact, viz., that there are two kinds of memory, very often opposed to each other, and that the use of the first tends to weaken the second and higher memory:

(1) A mechanical, artificial memory, dependent entirely upon mechanical aids from the senses,—a passive memory which often results in 'wandering' thoughts, led astray by superficial observation;

(2) An intelligent,[1] active memory, that *selects for itself* points of natural interest, classifying all objects by comparison and contrast.

Both kinds are necessary, the first as a means to an end —as the servant of the second; but the cultivation of the first should never be made *the object of a class lesson.* Tables

[1] It will be seen afterwards that even very young scholars are capable of exercising the intelligent memory.

of weights and measures (unless the lesson be preparatory and explanatory), lists of capes, historical dates, grammatical definitions, etc., are not subjects for class lessons; they should be prepared by younger children in silent lessons, and by older children in home lessons.

We have said that the two kinds of memory are opposed. You will find that the more you cultivate artificial memory the natural attempt to select what is most interesting will become weaker, and you will rely more and more on sound and sight; *vice versâ*, an intelligent thinker will have an increasing dislike to learning by heart, especially after the eighteenth year of age.

Both memories should be cultivated from the first, but they should be kept apart, each to its proper use. As it is found very difficult to form the habit of artificial memorising, when the habit of intelligent memorising has been in a large measure formed, we recommend all teachers to cultivate the artificial memory *early*, but *in its proper subordination.*

Now, let us dismiss for the present the Artificial Memory, as the less important subject of our thoughts, though we shall sometimes recur to her, and let us introduce you to the Intelligent Memory, and let her say for herself what she thinks of your lesson.—'My dear boy or girl, your intentions were very good, you were anxious to supply me with plenty of food; but you have made my head swim with the number and rapidity of your dishes. You have overloaded my digestion, the food was not cooked or flavoured according to my simple tastes. In plain English, you crowded so many objects into your lesson, that you did not give me time to concentrate my *attention* on any one object; you gave me no clear mental *picture* of each object; you did not draw upon my *previous knowledge* of geography or common things for comparison or contrast.'

Memory says: I need two things especially,—

(1) *Sufficient time* to take a good look all round a new object.

(2) Some connecting link supplied by *my own knowledge*, to which to attach the new object of thought.

You know what different shapes I take in different persons. I have as many different shapes as a certain fabulous Proteus, who could change his shape (the ancients believed) as often as he pleased. I take rather a heavy, lumbering shape in a country lad, because he has seen so *few real objects* to which to attach new ideas, and a great part of your lesson was *words*, not *things* to him; but if he takes time to grasp a new idea, he has this advantage, that there is nothing to confuse him, and if he is slow, *he is sure and clear so far as he goes.* I take a nimble, alas! too nimble a shape in the London boy: he sees plenty of objects, and if he would only *take time to observe minutely*, would have distinct ideas and plenty of them; but he is like one of his own sparrows, in this street one moment and in that street the next; he has *plenty* of ideas, but no *distinct* ideas; *he is quick, but wanting in depth, though his knowledge covers a large surface.*

If you can contrive to form two habits in your class, you will be giving them the benefit of *a good memory for life.*

(1) *Attention*, slow, grave, deliberate, to secure distinct, clear, well-marked ideas or mental pictures, acquired through *each of the senses*, that can be employed.

(2) *Association* of these ideas, through common qualities, by which you can connect them with each other, so that each idea may naturally and immediately suggest its appropriate companion idea or ideas.

There can be no true memory without these two: without *attention*, your mind will be a sort of dim, cracked looking-glass, reflecting your face in all kinds of blurred, crooked fashions; without *association*, your mind may be compared to a chest of drawers, full of tossed and tumbled articles,

where the right article never comes to hand. All sorts of clumsy attempts are made to abridge mental efforts; make it your golden rule, *never to hurry a willing child.*

For, observe, you do not want to *re-collect* things slowly and painfully, you want to *remember* them quickly and easily. Re-collection implies an *effort* of the mind to recall or gather together the parts of a picture which should *come together of themselves.* Memory should act at once, without an effort of the will, if (1) the mental pictures are clear, and (2) if they are properly connected.

How do I remember?—Do not merely ask yourself, What is my memory like? but ask yourself *What* things do I remember best? and, *How* did I come to remember them? Do not deal in abstract ideas and allegories, as if you were a philosopher or a poet. Some fanciful person might say: 'Memory is like a chain, binding all periods of life together with links of gold; or like a beautiful silk fabric, crossed and re-crossed by brighter or darker lines, forming bright or dull patterns; or like rays of light, constantly crossing, and sometimes interfering.' Such fanciful illustrations could only give you a picture of the *power of association* which memory possesses,—how a single thought may carry our minds in many different directions.

We have another reason for disliking to talk about abstract terms, which are useful enough for general reasoning, but the very worst words for young people to employ when trying to realise their own mental powers. You may often hear people talking of memory, imagination, conception, etc., as if they were various compartments of a curious, tightly packed box, called the mind, instead of the living, real 'I,' which, perhaps, never thinks at all without combining all these powers in one single act of thought. Let us give you this hint, when you hear your thinking mind, *i.e.* yourself, spoken of in abstract terms, such as sensation, or perception, translate them into the first person: *I* feel some-

thing, *I* perceive something. You should not then ask yourself, What is my memory? but *What* do *I* remember best? and, *How* do *I* remember it?

Can I not recall three different periods of remembering?

(1) That of early childhood; when impressions of my senses were almost everything; when I could not help associating all my ideas with pretty pictures, sweet scents, pleasant sounds.

(2) That of later childhood; when I learned to take pleasure in stories of action, life, and motion; when Alfred the Great, Wellington, Livingstone, men of action, were my favourites; when I watched living creatures, as if they thought, felt, and acted like myself.

(3) The age of reflection, comparison, judgment; when I first understood the pleasures of science, of history, and could analyse, classify, define.

Do not be astonished if we say that a good memory depends on the first of these stages quite as much as on either of the others; that it rests, as its basis, upon clear sense-impressions in early childhood. Dim impressions on the organs of sense, the eyes, or the ears must be followed by dim ideas.

Probably, also, whenever you think of any object in after life, you have, even in a dark room, the power of recovering the impression recorded on the brain by something you saw in childhood, which has ever since been the starting-point of a long succession of thoughts, that were never to be separated from the original sensation.

For this reason, not only should the first distinct impression upon the senses be very clear at the time (though that is very important), but to establish a *life-long remembrance* of the same object you ought to be very slow and sure in your first introduction of any new object or idea to the mind of a young child. We cannot press upon you

too strongly the value of the habit of concentrating the attention upon an object until it is thoroughly known. Why does an artist of inferior genius often paint better pictures than another of superior genius? Because he has learnt to *observe* better *each part* of a picture, and therefore he can *remember* better each part, and put the whole together again.

Why do very old people remember best the things that happened in their childhood? Because the impressions upon their senses were deepest in their childhood; the later sense-impressions upon the brain have vanished, and with them their *associated ideas*; the deeper sense-impressions of childhood have remained, and are the foundation and starting point of those associated ideas which still remain.

CHAPTER II.

ATTENTION.

THE next important thing is to remember that it takes *a certain time* to make an impression upon the organs of sense. Probably you have learnt some elementary lessons on physiology, and have been told about the action of the nerves on the brain, and the message back from the brain by a second set of nerves to the muscles. All this takes a very short space of time, but it does *take time*, and time too *that can be measured.*

Very clever physiologists tell us that the sense of touch acts quickest, and the sense of hearing more quickly than the sense of seeing; yet children are often expected to see quite as fast as they can hear. We have seen the question asked, whether so large an animal as a whale would not feel a blow on the end of its tail later than smaller animals, the nerve-impression having a much longer journey to take: probably he would, if the rate of travelling of similar nervous action in all animals were equal.

Teachers must study physiology.—Now, let me ask you an important question: Do you consider it your duty to supply information as quickly as you can, and to fill the mind with facts, or do you wish to *educate* your children? One important part of their education is the recognition of the fact, that you are not filling a machine, but assisting a thinking being to develope itself; we say *assisting*, because, happily for children, this development takes place often in spite of bad teachers. This caution is especially necessary

in this early stage, because much that is useful in the early stages of teaching—the cultivation of the memory of words, tables, etc., by means of the senses only, is *absolutely bad for older children.* Learning whole pages by heart to be reproduced at examination, is often to require the memory of *sounds* only, instead of associating some *reality* with the sounds. All words are useless that are not symbols of clear ideas. Object lessons are especially valuable in this early stage, because every new word that is taught, if properly taught, is connected with real objects ; mere repetition of names of qualities, etc., is not a real object lesson.

Remember, then, that the foundation of all memory is *attentive* observation of the parts of any picture, real or mental. Drawing, therefore, may form a valuable part of true education, because, even in the simplest copy, the learner is obliged to study every line, and there are some copies that are never forgotten, because so thoroughly studied. Abundant time should be allowed for attentive observation, whenever you introduce a new object to the children, that each set of nerves, of hearing, seeing, touching, may carry the proper message to its own part of the brain. It should be handled, its form and colour, its size, its similarities and differences in regard to objects previously known, should be slowly and carefully noticed, and stated by the children in their own language : whatever new facts or ideas you communicate yourself should be given by way of comparison with other known objects or ideas.

We give some examples of lessons.

A lesson on a camel.

You call upon the class to *observe* the picture, or (better still) the model, you have placed before them. We say purposely a *model*, for we would advise all schools to keep models rather than diagrams, *e.g.* cheap carved animals, that can be passed from hand to hand, as we use globes for geography rather than maps. You can then compare its form, colour, size, with those of other animals *known to the children.*

Or a lesson on some mineral.

You wish to teach its qualities, among which you perhaps mention 'fusible.' You would not expect your class to remember the *fact* that it would melt from the mere *word* fusible; you would probably have your apparatus ready—a spoon and a bit of lead. They would see the lead melt, and would always *remember the meaning of fusible*, because they had seen it; otherwise, your 'fusible,' 'malleable,' etc., would be only empty sounds.

Or a lesson on some simple natural phenomenon: on the formation of dew, or on the rising of water in the common pump.

Would you expect the children to *remember* much about either, unless they actually *saw* drops of vapour condensed, after evaporation, on a cold surface, or unless they *saw* water rising in a glass tube under pressure of the air? Such lessons are especially valuable in all elementary schools, because the teacher himself deduces principles from realities, and calls upon his class to state these principles in their own language and not in the words of a book.

Or a lesson on a river, in geography.

A bad teacher would begin with a definition of a river, *i.e.* with mere words that would *mean nothing* to the class. A good teacher would make a *model* in clay or sand, so that the class could see the basin, watershed, tributaries, etc., and *could make other models varying in details, for themselves.* A teacher not quite so good would perhaps be content with the illustration of a river, taken from the walls of the schoolroom. That would be better than mere definition in words; but the class would probably remember only the particular form of a river basin, as given in that illustration, and would form only one stereotyped impression of all rivers.

Or a lesson on literature: a piece of poetry to be learnt, or story to be reproduced.

A bad teacher would again be satisfied if the words were

learnt by heart, not caring whether by sound or sense. A good teacher would not be content till the class had picked the passage to pieces, had parsed it perhaps and analysed it, and certainly had been questioned on the meaning of the words, on the principal thoughts, and their relation to each other, with such illustrations of words and thoughts as could be furnished by the children's own ideas.

You should read your story or descriptive poem to your class, point out the chief topics, their relation to each other, and the chief beauties of the language, so that the class may form a well-proportioned picture of the whole in their own minds.

Test of real attention.—Do not then believe that you have thoroughly won the *attention* of your class, and that they have made the new idea *their own*, unless they can repeat the substance of the lesson in *their own words*, and (if they are old enough) have *written it out* in their own language. If they can do that, you will have secured one part of a good memory, *the formation of a habit of paying attention.*

Do not be discouraged if you fancy some children take in your ideas less quickly than others. The quick, precocious child often sees only one side of a question, and passes quickly to something else; a slow, thoughtful child is really taking in the idea, looking at it from more sides than one (possibly from some side that you yourself have forgotten), and is probably forming a better habit than the others. Never forget that *habits, both intellectual and moral,* are the chief end of all education.

How to secure attention.—You see, then, that the formation of a good memory depends in the very beginning upon close attention, and that close attention implies *activity* of mind voluntarily exerted. But ask yourself, Why should children give themselves so much trouble simply because

you wish it? Do not expect them to do it from pure affection to yourself (though it is a great help to a teacher to have secured the affection of the scholars), but lead them to find in the lesson *some pleasure*, which they are beginning to taste or have already tasted. We do not suggest tempting little children to learn with a lump of sugar; very little children are quite capable of giving attention from a higher pleasure than that; moral pleasure, love of duty, affection, will also attract them; but they are not the pleasures of *the particular thing*, of the special task; each particular task should have *its own pleasure* in the sense of *useful effort* and *success achieved*, whether it be a task of mind or body.

We wish here to record our protest against pain being in any sense a help to education, except indirectly. We do not deny that a wilfully idle boy may require to be roused perhaps by bodily pain to make a mental effort; but the pain itself disgusts the child and causes him to dislike the thing to be remembered. The idea is therefore associated inseparably with the pain of body, and becomes useless for purposes of a good memory, which dwells only on pleasurable ideas. But putting aside bodily pain we would also protest against the cruelty of compelling children to commit to memory tasks actually painful either from their impossible length or from their uninteresting and unintelligible matter. The good practice of a pleasurable habit of learning by heart a suitable quantity of suitable matter has suffered from a natural reaction; but we are now returning to better things, and we are convinced that there are few efforts more pleasant to children than the consciousness of having committed to memory a suitable task, *i.e.* of having formed a clear and complete picture of some interesting subject. Do not let the time pass for storing your scholars' minds with an abundance of distinct pictures, which they can represent to their own minds and describe in their own words.

CHAPTER III.

ASSOCIATION.

Association.—We have seen that memory depends upon close attention in the first instance, and that good mental pictures, produced by the deliberate use of all the senses, and confirmed by repeated comparisons and contrasts, are its foundation. But the formation of a good memory implies something more. It would not be sufficient to have separate pictures of everything, if these pictures had no connection. All ideas which we wish to connect should be so associated together, that one may *without any effort on our part* reproduce the other. The act of memory should be instantaneous, involuntary, and not a slow, compulsory recollection or recalling. There are some ideas which good education ought to associate so closely that they can never be separated.

Association, of what kind.—Those who have made a special study of memory, tell us that there are several ways in which our ideas may be associated.

Two ideas may be connected,

(*a*) Because, though they are quite unlike, they may have been *placed* together, or may have occurred at the same *time—an association of mere neighbourhood*, either of place or time; *or*,

(*b*) Because there is so much likeness or unlikeness in some points, that the similarity or the contrast of their qualities may bring up both objects together—*an association of likeness or unlikeness;* or,

(*c*) Because one follows close upon the other, as an effect follows upon its cause; so that an apple falling from a tree, or the revolution of the moon, or the pendulum of a clock, may all suggest the force of gravitation which resides in the earth—*an association of dependence.*

Associations of place.—There are then three chief ways in which things come to be associated in our minds. We have seen that the first of these laws is at work from the beginning of a child's life. A child begins from the outset to associate two things together by means of some one of its senses. Animals, that have *seen* two things repeatedly associated together, *remember* them always together. This is the first kind of remembering; and it follows, from what we said before, that even with very young children it is possible for the teacher, from the first, to begin to form a habit of memory, by means of some pleasurable association connected with some one or more of the senses. We do not advise that even very little children should be tempted with a dainty, though we have known grown-up people whose early memory of places has been associated with one of the lowest of all pleasures, that in a certain place, or at a certain time, they had a particularly good dinner or tea. Doubtless, the first remembrance of a mother is associated with the nourishment she gave; the first effort of memory in all animals is evidently this same association.

Associations of sight.—But at school age we do not advise that the first habit of memory should be formed, or even assisted, through the appetite; probably, before little children come under your care they will be able to appreciate higher pleasures of the senses, such as beautiful pictures, pleasant sounds. Many wise educationists have recommended that every schoolroom and nursery should be hung round with the most pleasing and various forms and colours

that each object admits of, and the object pourtrayed so distinctly as to be easily gathered by the eye *in its smallest parts.* Your own experience will tell you how confused an impression children often carry away from seeing objects so small that untrained powers of sight cannot separate their different parts. How often do they learn to read badly because the type of the printed card is too small, or work sums badly because they are allowed to make too small figures. Every letter and every figure for beginners cannot stand out too boldly by itself. Why do you so often see puffing advertisements printed in very large type, and repeated several times on walls? Why do advertisers send a row of 'sandwich men' carrying the same picture on their backs? Because the attention of many people is so hard to fix, that it requires *a repetition of large types or pictures* to catch their eye distinctly. If this is the case with grown-up people, how much more with young children?

Indistinctness produced by confusion of too many colours should also be avoided. Even a wall-map, to be of real service, should contain just as many names printed in large type as can be easily read by a class at ordinary class distance, and should not be printed in so many colours as to distract the eye.

Above all, avoid any ugly pictures or vulgar stories, *i.e.* words offensive to good taste.

You might just as well people the world with dwarfs, or mis-shapen monsters, as allow your scholars' first impressions to connect themselves with ugly sights.

Associations of sound.—Again, all school songs should be well selected both in words and tune; nothing vulgar or merely ludicrous (the playful we especially commend), should be permitted. Nor should there be anything mysterious or unintelligible in the words of the songs, *i.e.* unintelligible to the children; for children,

like men and women, attach very undue importance to things that they do not understand. This is, unhappily, one reason why indecent words have such a hold on the memory, not because they are understood and liked, but, for the opposite reason, because they are not understood, and the mere mystery gives them a hold upon the memory, which keeps *returning* to the words in hope of a solution.

So also of speech: we believe that a great help to the memory of children is a clear and distinct utterance. Good expression and intonation must make deeper sense-impression; the pauses made by a good speaker or reader are great helps to marking the relative value of each word and thought; the mere fact of a complete stop or of pauses proportionate to the meaning of the passage, may be the chief means of securing attention to the individual parts, and so of securing a distinct picture of the whole.

Combined associations of sense.—We advise you, therefore, to surround children's first impressions with pleasant associations of form, colour, sound, scents of flowers, etc.; press all the senses into your service.

For older children, botany, more than any other science, seems to combine many of the sensible conditions that impress the minds of children pleasantly, viz. beauty of form, sweet scents, delicacy of structure, endless variety, etc. No science from its surroundings is more attractive, or even in large towns more accessible to schools. We would wish that for five months in the year, at least, botanical lessons, *i.e.* scientific lessons upon a proper variety of beautiful objects, were given in all schools.

Association of time.—Besides these accidental associations of place or relative position, there are other associations which spring from an accidental connection of time with the subject of our thoughts, such as the particular time of day

or year at which a thing has happened, or habitually happens. Not one of the least uses of infant schools is the early association of nine o'clock, or some other hour, with the pleasant habit of going to school; we should imagine that very few truants are to be found among children who remember their infant school habits. Many uneducated people have no other ideas of time than those connected with the small events that have happened to their own families or in their own immediate neighbourhoods.

Higher associations.—We will now leave these associations which depend upon the senses only, whether accidentally produced, or really belonging to the object itself, and proceed to other associations, which require some power of *reasoning*, *i.e.* the comparison of two independent objects through the higher association of common qualities, or of necessary dependence, as of an effect upon its cause.

Playful attempts at wit.—We see the first glimmerings of such a natural seeking for association, in a child's superficial attempt at witty sayings. It has been often suggested that children should be encouraged to make little plays upon words. These may be, and generally are, very superficial, and founded upon sound, perhaps a rhyme, or a syllable common to two words. Nevertheless, they encourage the habit of looking out for some kind of resemblance or difference, by which two words or two ideas may be associated together. There are some kinds of conundrums which children will grasp before older people, because the answer lies on the surface in the sound, while older people are trying to establish a deeper connection between two apparently irreconcilable things. A playful, though perhaps superficial, association, will often establish a connection never broken in after life. Avoid merely ludicrous associations; the ludicrous idea generally takes root itself in the memory to the exclusion of the very idea you wish to establish.

Learning by heart.—We know that there has been a great and reasonable prejudice against too much learning by heart. Not many years ago, and perhaps still with unintelligent teachers, a great part of the lessons consisted of a parrot-like repetition of tasks, imperfectly understood. Probably, if you are an intelligent teacher, and have observed an intelligent class of older children during a repetition lesson of tables, you will have noticed that, happily for their minds, you cannot confine them. They will be busy, whether you like it or no, in a more or less useful way. Remembering that they have already a good stock of ideas, which they, with or without their own will, must compare with other ideas, would you not attempt to supply *some higher idea* than they can themselves supply? You gave them a list of names—*words*, not *things*; the children repeated them after you; the thoughtless let their eyes wander all over the room, in search of some more interesting task; the thoughtful repeated, and looked attentive, but were really looking into their own minds, searching among the stock of ideas already accumulated for some connection of ideas.

We repeat that such lists of names should be committed to memory in silence, either preparatory to a series of lessons, or subsequent to such a series.

We prefer the latter, because it fixes in the memory, by inseparable association, the intelligent teaching of facts or ideas *already attached* to each name.

Lists of names to be few.—At the same time, such lists of names, dates, etc., should be no more than the extent of the children's knowledge requires; no name or figure should be allowed that does not, or will not, bear its own appropriate intelligent association. Pupil-teachers should, of course, commit to memory many more names than schoolboys; they are the tools of the future schoolmaster. For this reason we deprecate many of the cheap

text books on physiology and history, crammed full of lists of bones, nerves, royal marriages, battles, etc.; we deprecate maps crammed full of useless names, that never can be required. Every teacher should calculate beforehand what *stock of such names* he requires, and should suggest for each a playful memoria technica, *i.e.* a mechanical means of helping the memory.

Learning by sense is opposed to learning by mind.—But the chief evil of such lists is, that they are really destructive of the higher memory, which is built upon real, not accidental associations of ideas. There are wonderful stories told of whole poems committed to memory, merely by the help of a good ear; but it has been found that a particular piece could not be recalled without the repetition of some considerable portion which was not required; such a result, to say the least, must have been very inconvenient. How often, too, do we hear children, when repeating a piece of poetry which they do not understand, if they are brought to a standstill, go back over what they have already said, till they fall into the swing of the rhythm, and are carried over the sticking place.

Learning by 'heart' need not be learning merely by sense.—What we discourage therefore in learning by heart, is the mere learning by sense, *i.e.* by sound or sight; these are great helps, and have been largely used by clever inventors of various kinds of memoria technica. But we would advise all teachers to call in to their aid the pleasurable sense of the *utility* of each list. Every one labours more readily when he knows that there is some profit in his work, *e.g.*, a child will more quickly master the multiplication table, not by learning the whole by rote at once, but by being allowed to work sums in the earlier tables first; or the alphabet, if he is allowed to form some words with the easier letters before he is compelled to learn the shapes and

powers of all; or the tables of weights and measures, if he is allowed to call in the experience of common life, and weigh imaginary coals, or measure imaginary cloth.

Pleasurable association.—Remember what we said before, that no really successful effort of memory can be made without some pleasurable attraction to fix the attention upon the object; that painful associations create a dislike to the thing to be remembered, and that this aversion generally predominates and draws the mind away from it. Do you disbelieve that any pleasurable association can be formed with such dry facts as lists of weights and measures? We can point to one of the highest pleasures of which the human mind is capable, that of successful effort. Have you ever seen a boy come off a cricket field with a good score? Is that boy's pleasure in success greater than the pleasure of a boy who has succeeded in mastering a difficult task?

We do not know what truth there is in the story that is told of the Duke of Wellington watching boys returning from the playing-fields, and commending their efforts there as the true secret of winning future battles; but comparing small things with great, a child's pleasure in a difficult task is of the same kind as that of the scientific observer arriving at a successful result after the work of years.

Let the child first see, if possible, the *utility* of the task,—that there is some advantage to be gained by the effort, that the result is of more value than a convict's work on a treadmill. Let the task set be well within the power of the child; you can always proportion your praise to the difficulty of the task, but you can never compensate a child for the dreary effort of trying to lift a stone too heavy for its powers. We know few things more painful than the sight of a child kept in after school hours, hopelessly crying over a task which an ignorant or thoughtless teacher has insisted on its learning, without contributing any of those helps, either of the senses or the reason, which assist the memory of children.

Mechanical aids.—Let us now consider the advantages and disadvantages of mechanical aids to memory.

Many teachers object very naturally to some of the more elaborate systems, on the ground that the instrumental system is more difficult of acquisition than the knowledge towards which the system is only subsidiary. We quite sympathise with their objections; teachers do not aim at the production of a row of boys on a platform, pouring out strings of historical dates, and calculating products and quotients of amazing length. For ordinary schoolboys, and, we may say, for ordinary men of business, such a system absorbs time that can be better employed in intelligent teaching, because it promotes *recollection, not remembrance.* But some sort of memoria technica, or mechanical help towards retaining disconnected or only slightly connected facts in the memory, every teacher should devise for himself, or for his scholars.

We have known lists broken up into pieces, and pinned to different parts of the room, till Roman history was associated perhaps with the fire-place, Grecian with the door, English with the window. Any boy that has been feasted in beating the parish boundaries, never forgets the particular spots. Who does not know boys' tricks of abbreviating lists of facts into doggerel nonsense? Which of us is not grateful to the old doggerel, 'Thirty days hath November,' etc., for remembering the number of days in each month?

The 119th Psalm is much more difficult for English boys to remember than it must have been for Hebrew boys. It used to be called the Alphabet of Saints, because every eight verses began with one particular letter of the Hebrew alphabet. Each of the eight verses may begin in English with a different letter, and may want even this aid to memory.

We suppose then that you have adopted some easy memoria technica; but there are many smaller aids, if we only look for them, by which a long task may be broken up into several short ones. There are always some stages or

stepping-stones in every list, where a weary brain may rest for a second or two before making a fresh start; *e.g.*, we remember how the succession of the Kings of England was made easier by the facts that the first three Edwards followed each other, and that each of their reigns ended with a seven, 1307, 1327, 1377.

We remember, too, in the multiplication table, how pleasant it was to come to a rhythmical number, seven times seven are forty-nine. We remember too (but this we fear modern grammar has demolished) with what pleasure we hailed our old friend, the vocative case, following and nearly always resembling the nominative case. Encourage children to find out such stepping-stones for themselves; a long task, *broken up into short pieces*, is much easier.

We notice then that our early remembrances are greatly aided by our first sense-impressions, and that, for that reason, we ought especially to cultivate the connection of the highest ideas with these impressions, because this connection continues throughout our lives. But we ought to notice too (though it does not concern us as teachers) that the reverse process also takes place; not only will the thoughts we formed or the poetry we read be recalled by some little thing that accompanied them, the scent of a wild flower, or the shade of a tree, but the thought or the verse recalls the scene. An impression of a thought on the mind produces the same effect on memory as the impression of our senses, *i.e.* each recalls the other by their common association.

We should further notice, that we have the power of abridging the process of recollection; there may be a great many intermediate steps to be passed over before two ideas of greater interest can be associated, but if they are once associated, the intervening steps may be passed over with the speed of lightning. The teacher should always bear in mind the more important links in the chain, and picture those with greater vividness.

Intelligent aids to memory.—But let us now leave the aids to memory that depend upon the senses only, which are only the foundation of our thoughts, and come to the higher process, by which *ideas* or thoughts become inseparably associated with other *ideas* or thoughts.

Let us notice, first, that indistinct ideas, *i.e.* ideas that cannot be expressed in clear and definite language, are just as opposed to a good memory as indistinct impressions on our senses. Very often a name may be, as people say, on the tip of the tongue, almost vibrating in the air, but somehow the word will not come out. No idea is ever clear and distinct without the appropriate word. You see how important it is, therefore, to associate each clear idea with a definite mark, or *word*, by which it can be reproduced when it is required. But, more than that, there are so many cross threads running through our thoughts, that, unless the distinguishing qualities are so inseparably connected with the word as to throw into the shade all other ideas, a wandering habit of thought may be formed : *i.e.*, a thoughtless person may allow himself to be led by a train of superficial resemblances from one object to another; a thoughtful person would remember the essential distinguishing characteristics whenever the name of an object recurred.

Association by suitability of ideas.—The best memory, therefore, is that which recalls at once, by natural and easy habit, the ideas suitable to the age and capabilities of the learner.

Without entering into any long description of the mental processes by which the mind advances in knowledge, we wish to impress upon you the folly of dealing with abstract ideas, truth, justice, etc., before children have acquired sufficient materials for the habit of viewing objects apart from their qualities. The acquisition of these materials should be the chief object before the age at which most of our children leave school, say twelve years of age,

whereas reasoning about abstract ideas is too much practised at an early age. For example, a study of a constitutional history of England is absurd for boys who have not mastered the main facts of history, and learnt the actions of the great men of history sufficiently to compare their characters and motives. In grammar, many unwise attempts are made to teach the refinements of analysis to children, who can hardly form a simple sentence; abstract nouns are presented to them before the power of abstraction is possible for their minds. A great amount of trouble is taken to give boys unsuitable ideas; and bad memories are more frequent because unsuitable ideas do not give clear and well-defined mental pictures; no comparison between the ideas can be formed on which a judgment can be based.

CHAPTER IV.

MEMORY IN CONNECTION WITH SPECIAL SUBJECTS OF INSTRUCTION.

WE suppose, therefore, that in all our lessons we aim primarily at producing, by *comparison with the children's previous knowledge*, clear pictures of natural scenes in geography, of battle scenes and heroic deeds in history, before proceeding to classify those ideas, in order to form abstract conceptions.

We have said that impressions sufficiently strong for memory cannot be made without attention and association.

The first requires sufficient time for the picture to impress itself on the mind by the help of some one or more of the senses. The second requires
Suitability of the ideas to the age and mental development of the child.

We proceed to apply these two considerations to some of the subjects ordinarily taught in elementary schools.

A good arithmetical memory.—We begin with arithmetic, as one of the subjects in which all the laws of association that assist the memory are employed. Arithmetic is one of the few subjects ordinarily taught in elementary schools, in which the age of the children permits the highest association of cause and effect, as well as of the lowest association of neighbourhood. The first question is, What are the pleasurable associations that attract boys to the study of arithmetic? the teacher's

aim should be, by repeating and varying these pleasurable associations, to cultivate a good arithmetical memory.

We hold the following three to be the most powerful:

(1) Success in easy logical reasoning.
(2) Detailed scheme of working.
(3) Success in correct answers.

In accordance with what we have stated to be the foundation of a good memory, the first links of the association must be the scholar's own experience. Easy questions, relating to subjects familiar to the children, to be worked mentally, should be given in each case, in order that the idea which associates the problems may be grasped.

E.g. It is proposed to teach multiplication by seventeen to a class that understands the *idea* of multiplication, as being only a shortened form of addition, and is familiar with the *rules* for multiplying by ten and by seven separately. Some mental questions should be proposed, before the process is taught, that multiplication by seventeen is equivalent to adding the separate products by ten and by seven. Ex., three baskets and two baskets, each containing nine apples, will be found to hold as many as five baskets, each containing nine apples; after a number of such examples, the class might deduce the principle of the rule, that multiplication by a number is equivalent to multiplying by the parts of the number and adding the separate products.

We know that *such logical teaching of principles based upon the children's own mental efforts*, which is really the salt of arithmetic, is too frequently neglected,—that the mere mechanical, formal practice of *processes* supersedes the intelligent application of *principles*. We believe such a course to be in every way injurious. If a scholar is likely to proceed to higher studies, as algebra, he has formed a habit of unintelligent dependence upon a succession of disconnected puzzles. If he leaves school at once, he loses even the power of working the processes, and has no logical

intelligent habit formed. Whereas the boy who has deduced from common sense problems the principles by which those problems are associated, and has been further guided to deduce for himself the formal rule by which the principle is expressed in words, carries away with him from school a logical habit of mind. Should he return to school, as sometimes happens, after an interval, he can soon recall, without painful effort, but rather with pleasurable recollections, the process *through* the principle; the idea and the formal rule are associated, and each helps the memory to recall the other.

We hope to see the day when a good arithmetical memory will be recognised to depend, in the first instance, on good reasoning; when preparatory mental work will be required of each scholar, and the scholar will be guided by the teacher in deducing the formal rule, by which the principle may be exhibited on the black-board or slate.

What but a want of such intelligent training causes the almost entire failure in the more difficult processes of compound proportion, and division of decimals? On the other hand, what child, that has been intelligently taught to look below the surface of such a sum as $70{\cdot}5 \div {\cdot}05$ and recognise that it is equivalent to $\frac{705}{10} \div \frac{5}{100}$, or $\frac{705}{10} \times \frac{100}{5}$, or $\frac{705}{5} \times \frac{100}{10}$, can fail to recognise the truth of the ordinary rule, or to test for himself the correctness of his work?

Success in logical reasoning is the first and most important aid to memory in arithmetic. Next to this we place *neatness of work*, where each *figure* is formed in large and legible characters, and each *step of reasoning* clearly marked with detailed explanations at the side. What boy does not *remember* the pleasure with which he sometimes followed, sometimes anticipated, a sum in practice clearly worked on the black-board, with the reason for each step clearly given at the side, and how he checked each aliquot part until the full sum was reached? The effect of such neatness of work is still further impressed by placing three or four sums side

by side with just sufficient variety of form to define more clearly their common principle. *Repetition* of a process through easy examples, with full explanatory side-notes, should always be permitted before more difficult sums are given.

The third pleasurable association we noticed above was *success of work.*

In Arithmetic there is no real pleasure of success unless obtained by truthful, intelligent work; an answer that has been forced or obtained by methods imperfectly understood, gives no real satisfaction.

In success of work, it is essential not only that the steps should be carefully explained, but that each step should be accompanied by a number of easy examples, illustrating *that step only.* Only *one new difficulty* at a time should be presented to the class, and this thoroughly grasped by variety and repetition till the mind is prepared for another step. Clearness and distinctness are so necessary for a good memory, that greater success may be readily attained in classes where comparatively easy sums are worked, forming a graduated series of difficulties, presented successively, than in classes where the teachers, with a very praiseworthy effort, set more difficult sums, presenting several difficulties at once. We do not discourage the setting of difficult sums to a vigorous class; hard-working scholars will themselves demand harder sums, when the proper time arrives.

For the cultivation of good arithmetical memory we give the following suggestions:

(A) For the acquisition of a new rule:

(1) Place before the children, or, better still, collect from the children, a number of examples, containing the new idea in its simplest form.

(2) Let the children see clearly the common principle which led them to adopt the same mental process.

(3) Deduce the formal rule, which in most cases will be an abbreviation of the mental process.

(B) For the practice of rules :

(1) Give a series of graduated examples, presenting only one difficulty of working at a time.

(2) Supply explanations of each step of the process, carefully recorded at the side.

(3) Compare three or four such examples for analysis by the class.

(C) For test of knowledge, combining the former two :

(1) Give a series of easy problems requiring back rules, to be worked out catechetically with the teacher's help.

(2) Set a number of such problems of varying difficulty to the whole class, the difficulties to be explained by the teachers only when called upon.

We do not dwell now at length upon the lower kind of memory to be employed in learning by heart the addition and multiplication table, or tables of weights and measures.

We recommend repetition of the *same portions* at short intervals, for only a few minutes at one time, accompanied by music, where possible; division of tables into breaks at particularly difficult numbers.

The eye as well as the ear should also be trained by such devices as printing parts of the tables in different types, by diagrams and models of the different measures. Where practicable, actual weighing and measuring should be performed; there are few neighbourhoods where a weighing machine could not be borrowed, or the school-floor actually measured to prove the truth of a given measure.

Geographical memory.—We consider next in order a good *geographical* memory, because Geography presents more points in common with children's daily life than other school subjects, and furnishes a foundation of realities within easy reach with which other ideas may be associated.

It is quite possible to make children learn by mere mechanical processes lists of mountains, capes, etc.; to know all the countries of the world and their capitals, all the counties of England and their chief towns, etc. All such mechanical memories may have their *deferred* use, inasmuch as some short lists are absolutely necessary, but they are not *geographical* memories, they have not been mastered by *associations peculiar to Geography*, but by the same artifices and helps that apply equally to all feats of learning by heart.

An examiner might fairly say, Your class *has not yet begun to learn Geography.* The compilers of the ordinary manuals are more in fault than the teachers; such definitions and lists of names as they give are neither one thing nor the other; they are not complete as lists, and they have no scientific value. We say, then, to teachers, If you use such manuals, invest the names you propose to use with some common associations interesting to children, and *reject all lists that you cannot so invest.*

Disconnected facts tend to burden and weaken the memory; they present no association by which the higher laws of memory may work.

(1) You cannot compare or contrast them, because they give you no common qualities for classification.

(2) There is no necessary connection either of cause and effect or of any other dependence of one upon the other.

Our first point therefore in Geography is to keep in mind the ideas suitable and pleasurable to children according to their different ages, and to work by them from the children's own surroundings.

What then are these ideas?

(*a*) The pleasure of activity of motion from place to place. (Few boys have any pleasure in things at rest, in quiet scenes of nature.)

(*b*) The pleasure of novelty, as shown in their fondness for adventures in strange countries, desert islands, etc.

(*c*) The pleasure of comparing and contrasting foreign scenes, customs, etc., with those of their own country.

It is evident that the knowledge of Geography must begin with the child's knowledge of its own neighbourhood and surroundings, and that physical geography, if intermixed with political geography, should in all cases precede it.

The streams, hills, ponds, etc. of his own neighbourhood must serve as a basis or standard by which rivers, mountains, lakes must be measured, either for comparison or for contrast.

It may fairly be said, there must be some defective point in every child's experience: if he lives in a flat country, how is he to obtain an idea of a mountain? if he lives in a large town, how is he to obtain an idea of a country valley? We answer that every teacher must do the best he can with the circumstances of the neighbourhood; a church tower or a railway bridge may give the first idea of extended view, *i.e.* the idea of a hill scene. School excursions, especially excursions to the seaside, are very valuable helps to a child's enlarged ideas of physical geography; a starry night in an open field or garden may be profitably used for such elementary astronomy as is needed for conceptions of the earth's motion; the moving of the shadow along the school-room floor, the flow of the water in the street after a shower, and many other simple facts within every child's knowledge, are the real basis, however defective in some points, of his geographical memory; and without such clear ideas the definitions must be always *mere words*, the names of geography *mere lists*.

Having secured, then, a basis of known facts from the child's own surroundings, and *expressed in his own language*, the teacher proceeds to associate with them other scenes

that most nearly resemble home scenes, *first*, by the assistance of models made by the teacher and the children themselves, *afterwards* by the help of diagrams.

Reduced plans of the school-room, or village, or street, or town, on different scales, will present no difficulty in a school where Drawing is taught or Arithmetic is illustrated by the aid of appropriate diagrams.

We have enlarged at some length on these first ideas, because we think that physical geography should precede political, not as a whole, but that no political facts should be taught until the physical conditions of the scholar's district or county have been carefully noticed. First, lessons on a river should be so given, that all rivers, or a particular river, should always be *associated* with that standard idea of a river; each particular lesson would follow the same order, and only the peculiar features of other rivers would require to be noticed. Again, rivers may be grouped by comparison of length, or of rapidity of course, or of natural scenery, or of navigability. Contrast and comparison based upon the original standard of a river, suggested by the children's home knowledge, are the only sound groundwork of memory for geographical facts. The same course may be pursued with regard to other geographical ideas, mountains, currents of the ocean, etc., it being clearly understood that isolated facts, learnt by artificial memory, really weaken the natural memory.

Few subjects can be illustrated so well as Geography. Not only can the best models and diagrams be cheaply obtained, but every teacher with a black-board and a piece of chalk can help the memory better than the best wall-map, by drawing a map *so slowly* before the children, that each part, as it is drawn, has sufficient time to impress itself distinctly on the eyes of the class.

As to the amount of the matters of fact sufficient for a home lesson, it should never exceed so much as can be fairly amplified with good illustrations in the course of the next day's lesson; or, better still, should be a short sum-

mary of that day's lesson, to be catechised upon for a few minutes at the beginning of the next lesson.

Historical memory.—We have not sufficient space to say much about a good historical memory, except that the same general principles should be applied. Ascertain first, what groundwork of ideas you can find in lives of persons, or in events connected with the neighbourhood of your school; from them deduce your general portraits of soldiers, kings, or any leading men, by means of short stories. The object of History with young children should be to exhibit the actions of individuals, illustrating bravery, justice, mercy, patriotism, in a way suggested by the children's own feelings, and to establish both the similarity and the contrast between their own thoughts and actions, and those of men of all ages. Nothing like a philosophy of history should be attempted, or a history of institutions; the only real history likely to be remembered by children is the personal history of great men.

As regards the matters of fact to be learned by heart, we would advise the same course to be pursued as in geography; a small text book should be used, out of which only so much should be learned as may be a short summary of the day's lesson, or serve as a skeleton for the lesson of the next day.

Poetry.—Our space will not allow us to deal with all the subjects taught in schools, but we will note one more, viz., Literature.

There are few exercises so valuable as committing to memory *suitable* pieces of poetry, properly explained by analysis of the whole and illustration of difficult words. But children are often expected to learn by heart whole pages of unsuitable poetry, without any intelligent explanation. They are compelled to fall back upon the lower artificial memory, and trust to the rhyme or rhythm for recovery of the lost thread. How often do we hear children

trying back for this lost thread! How often do we hear them make nonsense, preserving both rhyme and rhythm, and believing that they have repeated their task correctly!

As to the selection of the poetry two essential conditions should be observed:

(1) The piece should be suitable, *i.e.*, dramatic, or, at least, should be full of life and action; for boys such poems as Macaulay's 'Horatius' or 'Ivry,' Scott's 'Marmion' and 'Lady of the Lake,' especially the battle-scenes; scenes from Shakespeare, either in dialogue or embracing several characters; for girls, such poems as Wordsworth's 'Lucy Grey.'

(2) The pieces should be also simple in language, should not contain too many words of Latin extraction, such as Gray's 'Elegy,' or Goldsmith's 'Traveller;' though a skilful teacher may often triumph over the difficulties of the language, and interest his class in the beauty of the thoughts.

We do not commend for boys the allegorical, or fabulous, or didactic; a more or less transparent clothing of abstract ideas with life and action, repels children; nor is sentimental interpretation of nature suitable to them.

(3) Before learning a piece of poetry by heart, the story should be told after the model of Lamb's 'Tales from Shakespeare'; the substance of the story should be written by the children; each difficult passage should be analysed, and (when necessary) fully parsed; the rarer words should be fully illustrated, that each word may fall into its proper place, and the whole form one or more distinct pictures to the mind. With these precautions, no such thing as learning by sound, or catchword repetition, will be possible.

We leave it to our readers to apply to other subjects the rule laid down in these pages.

We advise them—

(1) To ascertain how far their previous knowledge supplies *distinct mental pictures* with which the fresh knowledge may be associated.

(2) To give sufficient time for association of the *old* and *new* knowledge through suitable and pleasant ideas.

(3) To repeat with variety the points of view in which these associations may be regarded.

(4) To require the children to repeat in their best home language and to write out the substance of your lesson, which ought to be a succession of associated ideas from beginning to end.

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